

## AGE AND ACQUISITION

THE INCREASED pace of research on first language acquisition in the last half of the twentieth century attracted the attention not only of linguists in many subfields but also of educators in various language-related fields. Today the applications of research findings in first language acquisition are widespread. In language arts education, for example, teacher trainees are required to study first language acquisition, particularly acquisition after age 5, in order to improve their understanding of the task of teaching language skills to native speakers. In foreign language education, most standard texts and curricula now include some introductory material on first language acquisition. The reasons for this are clear. We have all observed children acquiring their first language easily and well, yet individuals learning a second language, particularly in an educational setting, can meet with great difficulty and sometimes failure. We should therefore be able to learn something from a systematic study of that first language learning experience.

What may not be quite as obvious, though, is how the second language teacher should interpret the many facets and sometimes conflicting findings of first language research. First language acquisition starts in very early childhood, but second language acquisition can happen in childhood, early or late, as well as in adulthood. Do childhood and adulthood, and differences between them, hold some keys to second language acquisition (SLA) models and theories? The purpose of this chapter is to address some of those questions and to set forth explicitly some of the parameters for looking at the effects of age and acquisition.

### DISPELLING MYTHS

The first step in investigating age and acquisition might be to dispel some myths about the relationship between first and second language acquisition. H. H. Stern (1970, pp. 57-58) summarized some common arguments that had been raised from

time to time to recommend a second language teaching method or procedure on the basis of first language acquisition:

1. In language teaching, we must practice and practice, again and again. Just watch a small child learning his mother tongue. He repeats things over and over again. During the language learning stage he practices all the time. This is what we must also do when we learn a foreign language.
2. Language learning is mainly a matter of imitation. You must be a mimic. Just like a small child. He imitates everything.
3. First, we practice the separate sounds, then words, then sentences. That is the natural order and is therefore right for learning a foreign language.
4. Watch a small child's speech development. First he listens, then he speaks. Understanding always precedes speaking. Therefore, this must be the right order of presenting the skills in a foreign language.
5. A small child listens and speaks and no one would dream of making him read or write. Reading and writing are advanced stages of language development. The natural order for first and second language learning is listening, speaking, reading, writing.
6. You did not have to translate when you were small. If you were able to learn your own language without translation, you should be able to learn a foreign language in the same way.
7. A small child simply uses language. He does not learn formal grammar. You don't tell him about verbs and nouns. Yet he learns the language perfectly. It is equally unnecessary to use grammatical conceptualization in teaching a foreign language.

These statements represent the views of those who felt that "the first language learner was looked upon as the foreign language teacher's dream: a pupil who mysteriously laps up his vocabulary, whose pronunciation, in spite of occasional lapses, is impeccable, while morphology and syntax, instead of being a constant headache, come to him like a dream" (Stern, 1970, p. 58).

There are flaws in each of the seven statements. Sometimes the flaw is in the assumption behind the statement about first language learning; sometimes it is in the analogy or implication that is drawn; sometimes it is in both. The flaws represent some of the misunderstandings that need to be demythologized for the second language teacher. Through a careful examination of those shortcomings in this chapter, you should be able to avoid certain pitfalls, as well as to draw enlightened, plausible analogies wherever possible, thereby enriching your understanding of the second language learning process itself.

As cognitive and constructivist research on both first and second language acquisition gathered momentum, second language researchers and foreign language

teachers began to recognize the mistakes in drawing direct global analogies between first and second language acquisition. By the 1970s and 1980s, criticism of earlier direct analogies between first and second language acquisition had reached full steam. Stern (1970), Cook (1973, 1995), and Schachter (1988), among others, addressed the inconsistencies of such analogies, but at the same time recognized the legitimate similarities that, if viewed cautiously, allowed one to draw some constructive conclusions about second language learning.

### TYPES OF COMPARISON AND CONTRAST

The comparison of first and second language acquisition can easily be oversimplified. At the very least, one needs to approach the comparison by first considering the differences between children and adults. It is, in one sense, illogical to compare the first language acquisition of a child with the second language acquisition of an adult (Foster-Cohen, 2001; Scovel, 1999; Schachter, 1988; Cook, 1973). This involves trying to draw analogies not only between first and second language learning situations but also between children and adults. It is much more logical to compare first and second language learning in children *or* to compare second language learning in children and adults. Nevertheless, child first language acquisition and adult second language acquisition are common and important categories of acquisition to compare. It is reasonable, therefore, to view the latter type of comparison within a matrix of possible comparisons. Figure 3.1 represents four possible categories to consider, defined by age and type of acquisition. Note that the vertical shaded area between the child and the adult is purposely broad to account for varying definitions of adulthood. In general, however, an adult is considered to be one who has reached the age of puberty. Cell A1 is obviously representative of an abnormal situation. There have been few recorded instances of an adult acquiring a first language. In one widely publicized instance, Curtiss (1977) wrote about Genie, a 13-year-old girl who had been socially isolated and abused all her life until she was discovered, and who was then faced with the task of acquiring a first language. Accounts of "wolf children" and instances of severe disability fall into this category.

	CHILD	ADULT	
L1	C1	A1	L1 = First language
L2	C2	A2	L2 = Second language
			C = Child
			A = Adult

Figure 3.1. First and second language acquisition in adults and children

Since we need not deal with abnormal or pathological cases of language acquisition, we can ignore category A1. That leaves three possible comparisons:

1. First and second language acquisition in children (C1-C2), holding age constant
2. Second language acquisition in children and adults (C2-A2), holding second language constant
3. First language acquisition in children and second language acquisition in adults (C1-A2)

In the C1-C2 comparison (holding age constant), one is manipulating the language variable. However, it is important to remember that a 2-year-old and an 11-year-old exhibit vast cognitive, affective, and physical differences, and that comparisons of all three types must be treated with caution when varying ages of children are being considered. In the C2-A2 comparison, one is holding language constant and manipulating the differences between children and adults. Such comparisons are, for obvious reasons, the most fruitful in yielding analogies for adult second language classroom instruction, and will be the central focus in this chapter. The third comparison, C1-A2, unfortunately manipulates both variables. Many of the traditional comparisons were of this type; however, such comparisons must be made only with extreme caution because of the enormous cognitive, affective, and physical differences between children and adults.

Much of the focus of the rest of this chapter will be made on C2-A2 and C1-C2 comparisons. In both cases, comparisons will be embedded within a number of issues, controversies, and other topics that have attracted the attention of researchers interested in the relationship of age to acquisition.

## THE CRITICAL PERIOD HYPOTHESIS

Most discussions about age and acquisition center on the question of whether there is a **critical period** for language acquisition: a biologically determined period of life when language can be acquired more easily and beyond which time language is increasingly difficult to acquire. The **Critical Period Hypothesis** (CPH) claims that there is such a biological timetable. Initially the notion of a critical period was connected only to first language acquisition. (See Singleton & Ryan, 2004, for a detailed overview.) Pathological studies of children who failed to acquire their first language, or aspects thereof, became fuel for arguments of biologically determined predispositions, timed for release, which would wane if the correct environmental stimuli were not present at the crucial stage. We have already seen, in the last chapter, that researchers like Lenneberg (1967) and Bickerton (1981) made strong statements in favor of a critical period before which and after which certain abilities do not develop.



In recent years, a plethora of research has appeared on the possible applications of the CPH to second language contexts. (See Ioup, 2005; Singleton & Ryan, 2004; Moyer, 2004; Hyltenstam & Abrahamsson, 2003; Scovel, 2000; Birdsong, 1999, among others, for useful summaries.) The "classic" argument is that a critical point for second language acquisition occurs around puberty, beyond which people seem to be relatively incapable of acquiring a second language. This has led some to assume, incorrectly, that by the age of 12 or 13 you are "over the hill" when it comes to the possibility of successful second language learning. Such an assumption must be viewed in the light of what it means to be "successful" in learning a second language, and particularly the role of *accent* as a component of success. To examine these issues, we will first look at neurological and phonological considerations, then examine cognitive, affective, and linguistic considerations.

## NEUROBIOLOGICAL CONSIDERATIONS

One of the most promising areas of inquiry in age and acquisition research has been the study of the function of the brain in the process of acquisition (see Schumann et al., 2004; Singleton & Ryan, 2004; and Obler & Gjerlow, 1999; for synopses). How might neurological development affect second language success? Does the maturation of the brain at some stage spell the doom of language acquisition ability?

### Hemispheric Lateralization

Some scholars have singled out the **lateralization** of the brain as the key to answering such a question. There is evidence in neurological research that as the human brain matures, certain functions are assigned, or "lateralized," to the left **hemisphere** of the brain, and certain other functions to the right hemisphere. Intellectual, logical, and analytic functions appear to be largely located in the left hemisphere, while the right hemisphere controls functions related to emotional and social needs. (See Chapter 5 for more discussion of left- and right-brain functioning.) Language functions appear to be controlled mainly in the left hemisphere, although there is a good deal of conflicting evidence. For example, patients who have had left hemispherectomies have been capable of comprehending and producing an amazing amount of language (see Zangwill, 1971, p. 220). Generally, a stroke or accident victim who suffers a lesion in the left hemisphere will manifest some language impairment, which is less often the case with right hemisphere lesions. However, before drawing any conclusions here, some caution is in order. Millar and Whitaker's (1983, p. 110) conclusion of over 20 years ago still stands: "Enough data have accumulated to challenge the simple view that the left hemisphere is the language hemisphere and the right hemisphere does something else."

While questions about precisely how language is lateralized in the brain are interesting indeed, a more crucial question for second language researchers has centered

on when lateralization takes place, and whether or not that lateralization process affects language acquisition. Eric Lenneberg (1967) and others suggested that lateralization is a slow process that begins around the age of 2 and is completed around puberty. During this time the child is presumably neurologically assigning functions little by little to one side of the brain or the other; included in these functions, of course, is language. It has been found that children up to the age of puberty who suffer injury to the left hemisphere are able to relocate linguistic functions to the right hemisphere, to "relearn" their first language with relatively little impairment. Adams (1997), for example, did a longitudinal study of a boy who at 8 years of age had no speech, underwent a left hemispherectomy, and then at the age of 9 suddenly began to speak!

Thomas Scovel (1969) proposed a relationship between lateralization and second language acquisition. He suggested that the plasticity of the brain prior to puberty enables children to acquire not only their first language but also a second language, and that possibly it is the very accomplishment of lateralization that makes it difficult for people to be able ever again to easily acquire fluent control of a second language, or at least to acquire it with what Alexander Guiora et al. (1972a) called "authentic" (nativelike) pronunciation.

While Scovel's (1969) suggestion had only marginal experimental basis, it prompted him (Scovel, 1988, 2000) and other researchers (e.g., Birdsong, 1999; Singleton & Ryan, 2004) to take a careful look at neurological factors in first and second language acquisition. This research considered the possibility that there is a critical period not only for first language acquisition but also, by extension, for second language acquisition. Much of the neurological argument centers on the *time* of lateralization. While Lenneberg (1967) contended that lateralization is complete around puberty, Norman Geschwind (1970), among others, suggested a much earlier age. Stephen Krashen (1973) cited research to support the completion of lateralization around age 5. However, Scovel (1984, p. 1) cautioned against assuming, with Krashen, that lateralization is *complete* by age 5. "One must be careful to distinguish between 'emergence' of lateralization (at birth, but quite evident at five) and 'completion' (only evident at about puberty)."

### Biological Timetables

One of the most compelling arguments for an accent-related critical period came from Thomas Scovel's (1988) fascinating multidisciplinary review of the evidence that has been amassed. Scovel cited evidence for a **sociobiological critical period** in various species of mammals and birds. (Others, such as Neapolitan et al. 1988, had drawn analogies between the acquisition of birdsong and human language acquisition.) Scovel's evidence pointed toward the development of a socially bonding accent at puberty, enabling species (1) to form an identity with their own community as they anticipate roles of parenting and leadership, and (2) to attract mates of "their own kind" in an instinctive drive to maintain their own species.

If the stabilization of an accepted, authentic accent is biologically preprogrammed for baboons and birds, why not for human beings? The sociobiological evidence that Scovel cited persuades us to conclude that native accents, and therefore "foreign" accents after puberty, may be a genetic leftover that, in our widespread human practice of mating across dialectal, linguistic, and racial barriers, is no longer necessary for the preservation of the human species. "In other words," explained Scovel (1988, p. 80), "an accent emerging after puberty is the price we pay for our preordained ability to be articulate apes."

Following another line of research, Walsh and Diller (1981, p. 18) proposed that different aspects of a second language are learned optimally at different ages:

Lower-order processes such as pronunciation are dependent on early maturing and less adaptive macroneural circuits, which makes foreign accents difficult to overcome after childhood. Higher-order language functions, such as semantic relations, are more dependent on late maturing neural circuits, which may explain why college students can learn many times the amount of grammar and vocabulary that elementary school students can learn in a given period of time.

Walsh and Diller's conclusions have been supported in more recent findings, reported by Singleton and Ryan (2004) and Hyltenstam and Abrahamsson (2003). We are left, then, with some support for a neurologically based critical period, but principally for the acquisition of an authentic (nativelike) accent, and not very strongly for the acquisition of communicative fluency and other "higher-order" processes. We return to the latter issue in the next section.

### Right-Hemispheric Participation

Yet another branch of neurolinguistic research focused on the role of the right hemisphere in the acquisition of a second language. Obler (1981, p. 58) noted that in second language learning, there is significant right hemisphere participation and that "this participation is particularly active during the early stages of learning the second language." But this "participation" to some extent consists of what we will later (Chapter 5) define as "strategies" of acquisition. Obler cited the strategy of guessing at meanings, and of using formulaic utterances, as examples of right hemisphere activity. Others (Genesee, 1982; Seliger, 1982) also found support for right hemisphere involvement in the form of complex language processing as opposed to early language acquisition.

Genesee (1982, p. 321) concluded that "there may be greater right hemisphere involvement in language processing in bilinguals who acquire their second language late relative to their first language and in bilinguals who learn it in informal contexts." While this conclusion may appear to contradict Obler's statement above, it does not. Obler found support for more right hemisphere activity during the early

stages of second language acquisition, but her conclusions were drawn from a study of seventh-, ninth-, and eleventh-grade subjects—all postpubescent. Such studies seem to suggest that second language learners, particularly adult learners, might benefit from more encouragement of right-brain activity in the classroom context. But, as Scovel (1982, pp. 324–325) noted, that sort of conclusion needs to be cautious, since the research provides a good deal of conflicting evidence, some of which has been grossly misinterpreted in “an unhappy marriage of single-minded neuropsychologists and double-minded educationalists . . . . Brain research . . . will not provide a quick fix to our teaching problems.”

Singleton and Ryan (2004, p. 143) echo Scovel’s conclusion upon examining two additional decades of research on lateralization: “Clearly, the debate about the right hemisphere’s contribution to language processing is set to continue for some time. Since, as we have seen, there is not yet agreement on what constitutes good evidence in this matter, the inference must be that resolution of the substantive issues is still some way off.”

#### CLASSROOM CONNECTIONS

**Research Findings:** Although research is inconclusive about left- and right-hemispheric participation in language acquisition, a number of empirical and observational studies indicate that adults might benefit from a healthy dose of right-brain-oriented activities in the foreign language classroom.

**Teaching Implications:** Some approaches to language teaching (for example, Total Physical Response, the Natural Approach) advocate a less analytical approach and a more psychomotor, integrated, social atmosphere in the classroom. What are some typical right-brain-oriented activities that you have seen—or would use—in the language classroom?

### Anthropological Evidence

Some adults have been known to acquire an authentic accent in a second language after the age of puberty, but such individuals are few and far between. Anthropologist Jane Hill (1970) provided an intriguing response to Scovel’s (1969) study by citing anthropological research on non-Western societies that yielded evidence that adults can, in the normal course of their lives, acquire second languages perfectly. One unique instance of second language acquisition in adulthood was reported by Sorenson (1967), who studied the Tukano culture of South America. At least two dozen languages were spoken among these communities, and each tribal



group, identified by the language it speaks, is an exogamous unit; that is, people must marry outside their group, and hence almost always marry someone who speaks another language. Sorenson reported that during adolescence, individuals actively and almost suddenly began to speak two or three other languages to which they had been exposed at some point. Moreover, "in adulthood [a person] may acquire more languages; as he approaches old age, field observation indicates, he will go on to perfect his knowledge of all the languages at his disposal" (Sorenson, 1967, p. 678). In conclusion, Hill (1970, pp. 247-248) made the following assertions:

The language acquisition situation seen in adult language learners in the largely monolingual American English middle class speech communities . . . may have been inappropriately taken to be a universal situation in proposing an innatist explanation for adult foreign accents. Multilingual speech communities of various types deserve careful study . . . . We will have to explore the influence of social and cultural roles which language and phonation play, and the role which attitudes about language play, as an alternative or a supplement to the cerebral dominance theory as an explanation of adult foreign accents.

Hill's challenge was taken up in subsequent decades. Flege (1987) and Morris and Gerstman (1986), for example, cited motivation, affective variables, social factors, and the quality of input as important in explaining the apparent advantage of the child. Even more recently, Moyer (2004) has reminded us of a multitude of cognitive, social, psychological, and strategic variables affecting the ultimate attainment of proficiency in a second language.

### THE SIGNIFICANCE OF ACCENT

Implicit in the comments of the preceding section is the assumption that the emergence of what we commonly call "foreign accent" is of some importance in our arguments about age and acquisition. We can appreciate the fact that given the existence of several hundred muscles (throat, larynx, mouth, lips, tongue, and others) that are used in the articulation of human speech, a tremendous degree of muscular control is required to achieve the fluency of a native speaker of a language. At birth the speech muscles are developed only to the extent that the larynx can control sustained cries. These speech muscles gradually develop, and control of some complex sounds in certain languages (in English the *r* and *l* are typical) is sometimes not achieved until after age 5, although complete phonemic control is present in virtually all children before puberty.

Research on the acquisition of authentic control of the phonology of a foreign language supports the notion of a critical period. Most of the evidence indicates that persons beyond the age of puberty do not acquire what has come to be called **authentic** (native-speaker) pronunciation of the second language. Possible causes

of such an age-based factor have already been discussed: neuromuscular plasticity, cerebral development, sociobiological programs, and the environment of sociocultural influences.

It is tempting immediately to cite exceptions to the rule ("My Aunt Mary learned French at 25, and everyone in France said she sounded just like a native"). These exceptions, however, appear to be (1) isolated instances or (2) only anecdotally supported. True, there are special people who possess somewhere within their competence the ability to override neurobiological critical period effects and to achieve a virtually perfect nativelike pronunciation of a foreign language. But in terms of statistical probability (see Scovel, 1988), it is clear that the chances of any one individual commencing a second language after puberty and achieving a scientifically verifiable authentic native accent are infinitesimal.

So where do we go from here? First, some sample studies, spanning several decades, will serve as examples of the kind of research on adult phonological acquisition that appears to contradict what some have called the **strong version** of the CPH, that is, one that holds unswervingly to the predictability of age effects.

Gerald Neufeld (1977, 1979, 1980, 2001) undertook a set of studies to determine to what extent adults could approximate native-speaker accents in a second language never before encountered. In his earliest experiment, 20 adult native English speakers were taught to imitate 10 utterances, each from 1 to 16 syllables in length, in Japanese and in Chinese. Native-speaking Japanese and Chinese judges listened to the taped imitations. The results indicated that 11 of the Japanese and 9 of the Chinese imitations were judged to have been produced by "native speakers." In his latest study (2001) similar results were obtained with English learners of French. While Neufeld recognized the limitations of his own studies, he suggested that "older students have neither lost their sensitivity to subtle differences in sounds, rhythm, and pitch nor the ability to reproduce these sounds and contours" (1979, p. 234). Nevertheless, Scovel (1988, pp. 154-159) and Long (1990b, pp. 266-268) later pointed out experimental flaws in Neufeld's experiments, stemming from the methodology used to judge "native speaker" and from the information initially given to the judges.

In more recent years, Moyer (1999) and Bongaerts, Planken, and Schils (1995) also centered on the strong version of the CPH. Moyer's study with native English-speaking graduate students of German upheld the strong CPH: subjects' performance was not judged to be comparable to native speakers of German. The Bongaerts et al. study reported on a group of adult Dutch speakers of English, all late learners, who recorded a monologue, a reading of a short text, and readings of isolated sentences and isolated words. Some of the nonnative performances, for some of the trials, were judged to have come from native speakers. However, in a later review of this study, Scovel (1997, p. 118) carefully noted that it was also the case that many native speakers of English in their study were judged to be nonnative! The earlier Neufeld experiments and the more recent studies essentially supported the strong CPH. However, in the latest studies of age and accent, we find some equivocation from researchers who prefer to play down the accent issue and

look at other proficiency factors, since "the available evidence does not consistently support the hypothesis that younger L2 learners are *globally* [my italics] more efficient and successful than older learners" (Singleton & Ryan, 2004, p. 115).

Upon reviewing the research on age and accent acquisition, as Scovel (1999) and others have done, we are left with persuasive evidence of a critical period for accent, but for accent only! It is important to remember in all these considerations that pronunciation of a language is not by any means the sole criterion for acquisition, nor is it really the most important one. We all know people who have less than perfect pronunciation but who also have excellent and fluent control of a second language, control that can even exceed that of many native speakers. A modern version of this phenomenon might be called the "Arnold Schwarzenegger Effect" (after the actor-turned-governor in California), whose accent is clearly noticeable yet who is arguably as linguistically proficient as any native speaker of American English. The acquisition of the communicative and functional purposes of language is, in most circumstances, far more important than a perfect native accent. Hyldenstam and Abrahamsson (2003, pp. 578-580) reminded us of the positive side of the miracle of second language acquisition:

More surprising, we would like to claim, are the miraculous levels of proficiency that second language learners (at all ages) in fact *can* reach, despite the constraints that are imposed by our biological scheduling. That maturational effects, to a very large extent, can be compensated for is indeed encouraging. The subtle differences that we have assumed to exist between near-native and native proficiency are probably highly insignificant in all aspects of the second language speaker's life and endeavors, although *very* significant for a theory of human capacity for language learning. The highly successful L2 speakers that we have characterized as having reached "only" near-native proficiency *are*, in fact, nativelike in all contexts except, perhaps, in the laboratory of the linguist with specific interest in second language learning mechanisms.

Perhaps, in our everyday encounters with second language users, we are too quick to criticize the "failure" of adult second language learners by nitpicking at minor pronunciation points or nonintrusive grammatical errors. Cook (1995, p. 55) warned against "using native accent as the yardstick" in our penchant for holding up monolingualism as the standard. And so, maybe instead, we can turn those perspectives into a more positive focus on the "multi-competence" (Cook 1995, p. 52) of second language learners. Or, in the words of Marinova-Todd, Marshall, and Snow (2000, p. 9), we would do well to refrain from too much of "a misemphasis on poor adult learners and an underemphasis on adults who master L2s to nativelike levels." Instead of being so perplexed and concerned about how bad people are at learning second languages, we should be fascinated with how much those same learners have accomplished.

### CLASSROOM CONNECTIONS

**Research Findings:** Some researchers, such as Hyltenstam and Abrahamsson (2003), would like to see a more positive spin on second language acquisition, one with emphasis on what adults can and do accomplish rather than on the "native accent yardstick."

**Teaching Implications:** What are some of the positive and encouraging elements of adult second language acquisition? In your experience, what have you accomplished as an adult learning a second language that you might not have been able to do as well or as efficiently as a child?

Today researchers are continuing the quest for answers to child-adult differences by looking beyond simple phonological factors. Bongaerts et al. (1995) found results that suggested that certain learner characteristics and contexts may work together to override the disadvantages of a late start. Slavoff and Johnson (1995) found that younger children (ages 7 to 9) did not have a particular advantage in rate of learning over older (10- to 12-year-old) children. Longitudinal studies such as Ioup et al.'s (1994) study of a highly nativelike adult learner of Egyptian Arabic are useful in their focus on the factors beyond phonology that might be relevant in helping us to be more successful in teaching second languages to adults. Studies on the effects of Universal Grammar (White, 2003), of instructional factors (Singleton & Ryan, 2004), and of contextual and sociopsychological factors (Moyer, 2004) are all highly promising domains of research on age and acquisition.

### COGNITIVE CONSIDERATIONS

Human cognition develops rapidly throughout the first 16 years of life and less rapidly thereafter. Some cognitive changes are critical; others are more gradual and difficult to detect. Jean Piaget (1972; 1955; Piaget & Inhelder, 1969) outlined the course of intellectual development in a child through various stages:

- Sensorimotor stage (birth to 2)
- Preoperational stage (ages 2 to 7)
- Operational stage (ages 7 to 16)
  - Concrete operational stage (ages 7 to 11)
  - Formal operational stage (ages 11 to 16)

A critical stage for a consideration of the effects of age on second language acquisition appears to occur, in Piaget's outline, at puberty (age 11 in his model).



It is here that a person becomes capable of abstraction, of formal thinking which transcends concrete experience and direct perception. Cognitively, then, an argument can be made for a critical period of language acquisition by connecting language acquisition and the concrete/formal stage transition. However, as reasonable as such a contention might sound, even here some caution is warranted. Singleton and Ryan (2004, pp. 156–159) offer a number of objections to connecting Piagetian stages of development with critical period arguments, not the least of which was the “vagueness” and lack of empirical data in Piaget’s theory.

Ausubel (1964) hinted at the relevance of such a connection when he noted that adults learning a second language could profit from certain grammatical explanations and deductive thinking that obviously would be pointless for a child. Whether adults do in fact profit from such explanations depends, of course, on the suitability and efficiency of the explanation, the teacher, the context, and other pedagogical variables. We have observed, though, that children do learn second languages well without the benefit—or hindrance—of formal operational thought. Does this capacity of formal, abstract thought have a facilitating or inhibiting effect on language acquisition in adults? Ellen Rosansky (1975, p. 96) felt that initial language acquisition takes place when the child is highly “centered”: “He is not only egocentric at this time, but when faced with a problem he can focus (and then only fleetingly) on one dimension at a time. This lack of flexibility and lack of decentration may well be a necessity for language acquisition.”

Young children are generally not “aware” that they are acquiring a language, nor are they aware of societal values and attitudes placed on one language or another. It is said that “a watched pot never boils”; is it possible that a language learner who is too consciously aware of what he or she is doing will have difficulty in learning the second language?

You may be tempted to answer that question affirmatively, but there is both logical and anecdotal counterevidence. Logically, a superior intellect should facilitate what is in one sense a highly complex intellectual activity. Anecdotal evidence shows that some adults who have been successful language learners have been very much aware of the process they were going through, even to the point of utilizing self-made paradigms and other fabricated linguistic devices to facilitate the learning process. So, if mature cognition is a liability to successful second language acquisition, clearly some intervening variables allow some persons to be very successful second language learners after puberty. These variables may in most cases lie outside the cognitive domain entirely, perhaps more centrally in the affective—or emotional—domain.

A strong case for the superiority of children in **implicit learning** (acquisition of linguistic patterns without **explicit** attention or instruction) was advanced by Robert DeKeyser (2000). In a study of adult native speakers of Hungarian learning English, he found that certain adults, those with high general verbal ability, were able

to "use explicit learning mechanisms to bypass the increasingly inefficient implicit mechanisms" (p. 518). He went on to conclude:

If the Critical Period Hypothesis is constrained, however, to implicit learning mechanisms, then it appears that there is more than just a sizable correlation: Early age confers an absolute, not a statistical, advantage—that is, there may very well be no exceptions to the age effect. Somewhere between the ages of 6–7 and 16–17, everybody loses the mental equipment required for the implicit induction of the abstract patterns underlying a human language, and the critical period really deserves its name (p. 518).

In a response to DeKeyser, Bialystok (2002, p. 482) contested "the logic that connects [DeKeyser's] results to his preferred conclusions." Arguing that a strong case for a critical period must show a "discontinuity in learning outcomes" (that is, a maturational *point* in development that marks a change), Bialystok maintained that DeKeyser's data did not show such an effect. Rather, she maintained, the changes that DeKeyser observed in his subjects could have been the product of gradual change with age.

The lateralization hypothesis may provide another key to cognitive differences between child and adult language acquisition. As the child matures into adulthood, some would maintain, the left hemisphere (which controls the analytical and intellectual functions) becomes more dominant than the right hemisphere (which controls the emotional functions). It is possible that the dominance of the left hemisphere contributes to a tendency to overanalyze and to be too intellectually centered on the task of second language learning.

Another construct that should be considered in examining the cognitive domain is the Piagetian notion of equilibration. **Equilibration** is defined as "progressive interior organization of knowledge in a stepwise fashion" (Sullivan, 1967, p. 12), and is related to the concept of equilibrium. That is, cognition develops as a process of moving from states of doubt and uncertainty (disequilibrium) to stages of resolution and certainty (equilibrium) and then back to further doubt that is, in time, also resolved. And so the cycle continues. Piaget (1970) claimed that conceptual development is a process of progressively moving from states of disequilibrium to equilibrium and that periods of disequilibrium mark virtually all cognitive development up through age 14 or 15, when formal operations finally are firmly organized and equilibrium is reached.

It is conceivable that disequilibrium may provide significant motivation for language acquisition: language interacts with cognition to achieve equilibrium. Perhaps until that state of final equilibrium is reached, the child is cognitively ready and eager to acquire the language necessary for achieving the cognitive equilibrium of adulthood. That same child was, until that time, decreasingly tolerant of cognitive ambiguities. Children are amazingly indifferent to contradictions, but intellectual growth produces an awareness of ambiguities about them and heightens the need